

II.—On a Collection of Fishes from the Cameroon containing new Species. By Dr. EINAR LÖNNBERG, C.M.Z.S. &c.

SOME time ago I received from my friend Mr. Gunnar Linnell a collection of freshwater fishes brought together from three different localities of the Cameroon territory, viz. :—

1. The river at *Sanye* (also spelt *Sunyi*), not far from the sea, but above the influence of the salt water.

2. *Meme River*, far inland.

3. *Elephant Lake* at the station Johann Albrechtshöhe.

This collection is not large, but as it contains several species new to the territory and also some quite new to science I venture to describe it here.

*Isichthys Henryi*, Gill.

Four specimens from the river at Sanye, the largest about 200 millim. Although known from Liberia to Mayumba, French Congo\*, this species does not seem to have been recorded from the Cameroons before.

*Marcusenius brachyhistiis*, Gill.

A single specimen from the river at Sanye.

*Alestes nurse* (Rüppell).

Dorsal originating above ventrals. Sq. 25–26  $\frac{5}{3}$  l.

A. 15–16. D. 10.

Height of body  $3\frac{1}{5}$ – $3\frac{1}{8}$  times in total length †. Length of head nearly 4 times in total length. Head longer than high. Snout longer than eye. Eye  $3\frac{2}{3}$  in length of head. Interorbital space  $2\frac{1}{5}$ – $2\frac{1}{4}$  in length of head. Adipose eyelids present. Mouth broader than eye, but the posterior end of maxillary well in front of the vertical through the anterior border of the eye. Height of caudal peduncle about  $\frac{2}{3}$  of its length.

There are 16 teeth in the upper jaw, arranged as follows :— 8 form an inner continuous series; the 8 outer ones are remote from each other, and 6 are placed just at the outer margin of the jaw, viz. the 2 most median and the 2 most lateral

\* See Boulenger, "Revision of the Genera and Species of Fishes of the Family Mormyridæ," Proc. Zool. Soc. London, 1898.

† Without caudal.

or posterior on either side, the remaining 2 being situated a little further inwards in the interspace between the median and lateral pairs. The 8 outer teeth are tricuspid, the 8 inner of the uninterrupted series are much larger. Each tooth of the latter series has two transverse rows of cusps, the outer usually consisting of two cusps and the inner of three or more. The cusps of the inner row are larger, especially the middle one. All teeth are brownish. There are 8 pluri- (5-7-) cuspid teeth in an uninterrupted series in the lower jaw, and behind these a pair of conical fangs. The fangs are less brown than the large middle cusps of the pluricuspid mandibular teeth.

The second infraorbital is longer than the diameter of the eye. The pectorals are longer than the ventrals.

The tips of the pectorals are about as far from the base of the ventrals as the tips of the latter are from the anus—that is, about  $1\frac{1}{2}$  centim. in the largest specimens. The distance between the base of the pectorals and the snout is about half of the measurement expressing the distance between the snout and the base of ventrals. The caudal is deeply cleft, the outer rays being more than twice as long as the middle ones, or, in other words, the latter being only  $\frac{2}{3}$  of the former.

The colour of the preserved fishes seems to indicate that the colour of the living fish may have been brownish olive above and golden or silvery below. There might have been a dusky longitudinal band along the third row of scales counted from above; but I am very uncertain about this, as it is most conspicuous in such places where the scales are lost, but hardly visible where the scales remain. A black blotch situated on the body behind the opercle on a level with the eye, and on a vertical line drawn between the first and second third of the pectoral, is well visible on all specimens. Caudal fin reddish orange, perhaps with dusky border. Outer half of dorsal reddish orange, its basal half probably dusky.

Five specimens, measuring from 178 to 210 millim. in length, from the Meme River, far inland.

I am unable to find any features by which this fish could be distinguished from Rüppell's species as it is described in the literature. It thus appears to be widely distributed, as it is known from the Nile, Lake Victoria, Lake Rudolf, Senegal, Gambia, and Niger, but hitherto not from the Cameroon.

*Nannethiops uniteniatus*, Gthr.

A specimen measuring 44 millim. in total length and

another strongly mutilated, both from Meme River, far inland.

This species does not appear to have been previously known from the Cameroons, although recorded from Gaboon, the Gold Coast, and Ubangi.

*Clarias bythipogon*, Sauvage.

Three specimens from the river at Sanye, the largest measuring nearly 30 centim. in total length. It may thus be the largest known specimen of its kind. In his work 'Les Poissons du Bassin du Congo' Boulenger has recorded 23 centim.

*Auchenoglanis guttatus* (Lönnerberg).

A specimen from the Meme River, far inland.

*Malopterurus electricus* (Gmelin).

Several specimens from Sanye and the Meme River.

*Haplochilus infrafasciatus*, Günther.

Three specimens from the river at Sanye.

*Ophiocephalus obscurus*, Günther.

A specimen from the Meme River.

*Eleotris Büttikoferi*, Steindachner.

A young specimen from the Meme River most probably belongs to this species.

*Pelmatochromis Boulengeri*, sp. n.\*

Three (or four) inner series of small and an outer series of larger teeth. Depth of body  $2\frac{1}{2}$  to  $3\frac{2}{5}$  times in total length. Length of head  $2\frac{1}{2}$  to  $2\frac{2}{3}$  times in total length. Snout broad, rounded, with straight profile much longer than eye, which is contained about  $2\frac{1}{3}$  times in length of snout and  $4\frac{2}{3}$  times in length of head, and nearly  $1\frac{1}{2}$  ( $\frac{9}{13}$ ) times in interorbital width. Maxillary reaching about halfway between nostril and anterior border of eye. Four or five series of scales on the cheek; large scales on the opercle. Gill-rakers short. Dorsal XVI 10-11; spines increasing to the last, which measures  $\frac{3}{7}$  to  $\frac{2}{5}$  of the length of head. Pectoral about  $\frac{3}{4}$

\* I take the liberty of dedicating this new species to Mr. G. A. Boulenger, who has done more than anybody else to increase our knowledge of the West-African fishes.

length of head. Filamentous prolongation of ventral reaching beyond anus, but not quite to origin of anal. Anal III 7-8; third anal spine shorter, but stouter, than last dorsal. Caudal rounded. Caudal peduncle deeper than long. Scales smooth, 25 in a longitudinal series; transverse series  $\frac{3}{10}$  1. Upper lateral line 20, lower lat. line 8-10. On the smallest specimen, about 130 millim., four dusky transverse bars may be traced. All specimens have a black opercular spot near the upper end of the hind margin of the opercle. It seems as if the anal had been longitudinally banded with a distal and a basal darker band and a lighter (coloured?) one between.

Three adult specimens from the Meme River, far inland, the largest 140 millim.

In three young specimens, measuring from 47 to 63 millim. in total length, the height of body equals the length of head, and both are contained  $2\frac{2}{3}$  times in the length of head and body without caudal; but the eyes are, as usual in young fishes, comparatively larger, and are only contained 3 times in length of head, and the diameter of the eye is  $\frac{6}{7}$  of the length of snout.

In a seventh specimen, of intermediate size (80 millim.), the relative dimensions have approached those of the adult, the eye being contained  $3\frac{1}{2}$  times in length of head and about  $1\frac{2}{3}$  in length of snout.

This species is no doubt most nearly related to *Pelmatochromis Batesii*, Boulenger\*, from the French Congo, but differs from that species in its relative dimensions, among other things in its longer head, longer snout, smaller eye, one spine more in the dorsal, shorter anal spines, fewer scales, and (no doubt) different coloration.

In the following table some comparative measurements of different stages of development of this fish are given:—

Total length without caudal fin . . . . .	47 mm.	63 mm.	103 mm.	110 mm.
Length of head in % of total length.	38·3	38·0	38·8	38·1
Depth of body . . . . .	38·3	38·0	42·7	41·8
Distance from snout to anal fin . . . . .	69·1	71·4	72·8	71·8
"          "          "          ventral fin. . . . .	40·4	41·2	43·6	42·7
Length of "ventrals . . . . .	27·6	30·1	28·1	30·0
"          pectorals . . . . .	31·9	28·5	28·1	29·0
Depth of caudal peduncle . . . . .	17·0	15·9	16·0	15·4
Length of "          "          . . . . .	14·8	11·9	11·1	11·3
Diameter of eye in % of length of head . . . . .	33·3	29·1	23·7	22·6
Length of snout . . . . .	41·6	43·8	52·5	50
Interorbital breadth . . . . .	27·7	29·1	32·5	30·9

\* Ann. & Mag. Nat. Hist. (7) vol. viii. (1901).

From these measurements it will be seen that the relation between head and body is almost the same, but the height of body increases with age, which causes the distance from the snout to anal and ventral fins to be comparatively larger in the older specimens. The diameter of the eye compared with the length of head decreases a good deal, but the snout is enlarged with age\*.

*Tilapia lata*, Gthr., var. *camerunensis*, nov.

A specimen from Meme River resembles *T. lata* in almost every respect except that it has a smaller number of scales, so that only twenty-six can be counted in a longitudinal series. In this respect it resembles *T. Rangii*, Duméril, but differs on the other hand from that species in having shorter pectorals, which do not extend even to the vertical through the origin of the anal, still less beyond the same; but the pectoral is decidedly longer than the head. There are XVI dorsal spines and 12 soft rays. At the commencement of the soft dorsal there is, as in *T. lata*, a large black spot, and behind it three blackish streaks which are nearly vertical, but above the spot they curve forward and then become more longitudinal. There is a black spot near the upper end of the posterior margin of the opercle, and this is almost continued into a larger, less conspicuous, dark blotch extending downwards on the opercle. Four dusky transverse bands may be traced across the body. In other respects it agrees with the descriptions of *T. lata* †.

The specimen measures 128 millim. It was caught high up in the Meme River.

This form seems to be intermediate between *T. lata* and *T. Rangii*; whether it deserves specific rank or not I am unable to decide on only one specimen.

*Tilapia microcephala*, Bleeker.

Sq. 27  $\frac{3}{11}$  1. Lat. lin. sup. 21; lat. lin. inf. 10-11.  
D. XVI 13. A. III 11.

Height of body contained fully twice in the total length

\* Since the above was in print Mr. G. A. Boulenger has described another apparently nearly related species from the Niger Delta (Proc. Zool. Soc. for Nov. 18, 1902) under the name *P. Pellegrini*. The latter differs in having a larger number of scales (28-29) and a different coloration, besides some other differences in the relative proportions, &c.

† *Conf.* Boulenger, "A Rev. of the Afr. and Syr. Fishes of the Fam. Cichlidæ," Proc. Zool. Soc. 1899.

(without caudal). Length of head contained as nearly as can be three times in total length. Diameter of eye about two thirds the length of the snout. Interorbital space as broad as the snout is long. Diameter of eye contained nearly four times in length of head. Nineteen gill-rakers on lower part of anterior arch.

The body is high and broad and the outline of the forehead forms an even but steep curve from the origin of the dorsal to the snout.

*Tilapia (Gephyrochromis) Linnellii*, sp. n.

Length of head longer than greatest depth of body; the former is contained about  $2\frac{2}{7}$  times in total length (without caudal), or represents 41.4 % of the latter measurement in the female (?); but in the male (?) the length of head is contained about  $2\frac{2}{7}$  times in total length, or represents more exactly 43.2 % of the latter. Greatest depth of body is in the female (?) contained about  $2\frac{3}{4}$  times in total length, or represents 36.3 % of that measurement, while in the male (?) the corresponding figures are about  $2\frac{2}{3}$ , or 37.3 %. This greatest depth is found at the occiput, and the depth at the origin of dorsal is about 2 millim. less. Snout and forehead are very broad, and the profile slopes in an almost straight line from occiput to end of snout. Diameter of eye is contained fully twice (male) or a little more (female) in length of snout and about five times in length of head. Interorbital space not quite so broad as length of snout, but twice as broad as diameter of eye in the female, not fully that in the male. Maxillary extending about midway between nostril and eye. About 100 long, conical, slightly curved teeth form the outer comb-like series in the upper jaw, and inside of this is a rather broad band of tricuspid teeth\*. All teeth have brown points. Two series of large scales on the cheeks, still larger scales on the opercle. Sixteen short gill-rakers on lower part of anterior arch. Dorsal XV 12-13; last spine longest, which does not, however, equal a third (usually  $\frac{2}{7}$ ) of the length of head, but about two thirds of longest soft ray. Pectoral measuring about  $\frac{5}{6}$  of length of head and reaching beyond origin of anal. The filamentous prolongation of ventral is rather short, not reaching anus. Anal III 9-10; third spine longest, about equal to longest dorsal. Caudal squarely truncate. Caudal peduncle about

\* Although these teeth are quite plainly tricuspid, the lateral points are not so sharp as those figured by Boulenger (Trans. Zool. Soc. London, vol. xvi., 1901) from *Gephyrochromis Moorii*.

as long as deep. Scales 27-28  $\frac{3}{13-14}$  1; lat. lin. sup. 17-20; lat. lin. inf. 12-13. Peritoneum black.

The coloration appears to have been rather dark, but more or less so in different specimens. It seems, however, probable that the back and upper parts have been blackish, perhaps bluish black. In the specimens I take to be males the lower jaw, branchiostegal and jugular portions, ventrals and anal, as well as the tract between those fins, seems to have been (bluish) black. In those which I think are females the jugular portion appears to have been orange, the ventrals being not black, but only dusky, and only the basal half of the anal being black. The pectorals seem to have been light-coloured in all specimens. The upper end of the hind margin of the opercle is bordered with black in all specimens.

The number of specimens is eight, and their length (with caudal) varies between 180 and 200 millim.

The dentition of all these specimens is perfectly identical and of the same type as that of the fish from Lake Tanganyika on which Boulenger established the genus *Gephyrochromis* \*. When examined with the aid of the keys elaborated by Boulenger †, the fish from the Elephant Lake must be referred to the genus *Gephyrochromis*. It happens, however, now and then that members of the genus *Tilapia* vary with regard to their dentition in such a way that they exhibit an outer series of simple conical teeth. Sauvage has remarked this about *T. Desfontainesi*, Lacép., and in his valuable book on the Congo fishes Boulenger † observes concerning *T. microlepis* (also from Lake Tanganyika) that the lateral cusp of the enlarged anterior teeth is very small and sometimes absent. Certain specimens even approached *Paratilapia* so nearly "that they could have been referred to that genus, if one did not know that their teeth were bicuspid in a more youthful stage." A similar change may take place during the development and growth of this species as well, because, although in all specimens on hand the outer teeth have the same general shape, there may on some few of these teeth of the youngest specimen be found some slight traces of a lateral cusp. In these circumstances the characteristic that should distinguish *Gephyrochromis* from *Tilapia* loses considerably in importance, and it seems almost necessary to withdraw the genus *Gephyrochromis* unless other characters besides the dentition are found to separate it from *Tilapia*. Mr. G. A. Boulenger has kindly told me that he is of

\* Ann. & Mag. Nat. Hist. ser. 7, vol. vii.; Trans. Zool. Soc. London, vol. xvi. pt. 3, p. 156, pl. xx.

† 'Poissons du Congo,' Bruxelles, 1901.

the same opinion. There is, however, another possibility, namely, to regard *Gephyrochromis* as a subgenus of *Tilapia* and unite under the former name such species of *Tilapia* which, when fully adult, acquire an outer enlarged series of simple, unicuspid, conical teeth. I am uncertain, however, if this would be suitable, because the development of such teeth instead of the bicuspid *Tilapia*-teeth is no doubt an adaptation to a certain kind of diet\* that could have taken place quite independently several times, and in species of *Tilapia* of a rather remote kinship. If this is the case, a subgenus *Gephyrochromis* would include a number of fishes similar in consequence of a parallel adaptive development, but without close genetic affinity, and that would, of course, be unsatisfactory. For want of material I cannot express any certain opinion, but must leave the question open for the present.

The genus *Gephyrochromis*, hitherto monotypic, was originally established on a fish discovered by Mr. J. E. S. Moore, and named after him *G. Moorii*. The fish from the Elephant Lake, Cameroon, fully agrees with regard to the dentition on which the generic diagnosis was founded, but differs in other respects a good deal from the first-mentioned type. The Cameroon fish has a larger head, longer snout, smaller eye, smaller number of dorsal spines, but larger number of soft rays, as well in dorsal as anal fins, and smaller number of scales in a longitudinal series. The general outline of the two species is also different. Among the true *Tilapia* the fish from the Elephant Lake most nearly approaches *Tilapia macrocephala*. In addition to the distinguishing characteristic deduced from the dentition the following differences may be enumerated:—*Tilapia* (*Gephyrochromis*) *Linnellii* has a larger head, the length of which is much longer than the depth of the body, while in *T. macrocephala* the opposite is the case. The snout of *T. Linnellii* is longer when compared with the diameter of the eye, which latter, even in my youngest specimen, is contained fully twice in the former, but in *T. macrocephala* not more than  $1\frac{1}{2}$  times. The eye of the former is smaller, even in the youngest contained 5 times in the length of the head, but only "4 to  $4\frac{1}{2}$ " in *T. macrocephala*. The interorbital breadth of *T. Linnellii* is also somewhat larger. Its last dorsal spine is the longest, but comparatively much shorter than in *T. macrocephala*. In the latter it is said to be 40 % ( $=\frac{2}{5}$ ) of the length of the head, but in the former it varies between 27.5 and 30 % of the

\* Probably more carnivorous than that of other species of *Tilapia*.



same measurement. The pectoral of *T. macrocephala* is decidedly longer than the head, but in *T. Linnellii* a good deal shorter than the head. On the other hand, the ventrals are shorter in the latter, not reaching the anus.

*Tilapia (Gephyrochromis) Linnellii* seems accordingly to be quite a distinct species. To allow further comparison I append a table of comparative measurements of two specimens (not the same as used for the diagnosis):—

Total length without caudal fin .....	163 mm.	147 mm.
Length of head in % of total length .....	44·7	42·8
Depth of body .....	38·0	38·7
Distance from snout to anal fin.....	74·8	74·8
"                    "          ventral fin.....	45·3	46·9
Length of pectoral .....	36·1	36·0
"          ventral .....	22·7	24·4
Depth of caudal peduncle .....	13·8	14·2
Length of "          "          "          ".....	13·1	12·9
Diameter of eye in % of length of head .....	20·5	19·0
Length of snout .....	42·4	39·6
Interorbital breadth .....	35·6	39·6
Length of last dorsal spine .....	27·5	30·1

The specimens of *Tilapia (Gephyrochromis) Linnellii* were collected in the Elephant Lake, which is situated N.N.E. from the Cameroon Mountain, 9° 22' E. long., 4° 39' N. lat., and, according to André's map of 1901, 320 m. above the sea. The Swedish civil engineer P. Dusén, who has visited this lake, puts its altitude above the sea-level at 285 m., and informs us that it is a typical crater-lake\*. It is now drained by a tributary to the Mungo River; the former finds its way from the lake through the narrow Barombi cleft. In former times, however, Mr. Dusén thinks that the lake was drained through a now dry river-bed to the Meme River. The distance between the Elephant Lake and the sea along the Mungo River and its tributary is probably about 90 or 100 kilometres. In such a case this crater-lake seems to be rather isolated, and its fauna must be of great interest from a zoogeographical point of view.

In addition to the fishes described above, Mr. G. Linnell has sent me some Crustacea from the Elephant Lake, namely, *Potamonautes africanus* (A. Milne-Edw.) and *Palæmon (Bithynis) jamaicensis Vollenhoveni* (Herklots). Both species were represented by very large and beautiful specimens, and seem consequently to flourish very well in the Elephant Lake.

\* Geol. Fören. Förh. no. 155, Bd. xvi. (Stockholm, 1894).

Although these animals are quite interesting, especially the shrimp, I am afraid that they are of little or no value for the explanation of the origin of the fauna of the Elephant Lake. Both species occur in other fresh waters\* in the Cameroons. The crab may easily ascend a river, although its water should run somewhat swiftly, and even cataracts might be avoided by them in walking on land. The shrimp may not have the same faculty, but my friend Professor Y. Sjöstedt, who, from his two years' stay in the Cameroons, is thoroughly acquainted with the prevailing conditions, has told me that the shrimps are much esteemed by the negroes, who catch and eat them, transporting them alive in baskets from one place to another. The possibility is therefore not excluded that the shrimps have been introduced into the Elephant Lake by the natives.

III.—*On the Hymenoptera collected by Mr. W. L. Distant in the Transvaal, South Africa, with Descriptions of supposed new Species.* By Lieut.-Colonel C. T. BINGHAM.

[Continued from vol. x. p. 222.]

Family Eumenidæ (cont.).

Genus ODYNERUS (cont.).

*Odynerus (Pterochilus) insignis*, Sauss.

*Pterochilus insignis*, Sauss. *Etud. Fam. Vesp.* iii. (1856) p. 324, pl. xv. fig. 12, ♀.

A single male without locality. Described originally from the Cape.

Genus SYNAGRIS, Latr.

*Synagris cornuta*, Linn.

*Vespa cornuta*, Linn. *Syst. Nat.* ed. xii. (1767) p. 951.

*Apis cornuta*, Drury, *Illustr. Nat. Hist.* ii. (1773) p. 88, pl. xlvi. fig. 3.

*Synagris cornuta*, Latr. *Hist. Nat. Crust. et Ins.* iii. (1802) p. 360.

*Synagris cornuta*, Latr. *Hist. Nat. Ins.* xiii. (1805) p. 344.

One female, Isubu.

\* From the Meme River I received at the same time specimens of the same species of shrimp, although not so large, together with examples of *P. (B.) acanthurus* and *Olfersi*.